

geographical boundaries of contamination at a site based on historical site records and information obtained during the site visit. A determination will be made whether all the potential media of concern have been adequately addressed by evaluating the potential migration of contaminants from one medium to another. The potential migration of contaminants will be evaluated based on the physical/chemical properties of contaminants and site-specific conditions such as geology/hydrogeology, topography, etc.

2.3.2 Data Summary

The analytical data that are considered to be adequate for use in the site screening procedure will be summarized in tabular format for each site. The data summary tables will provide information that will be used in the comparison with risk-based benchmarks as described in Subsection 2.5. Separate summary tables will be prepared for each of the media of concern at a site. The data summary tables will include a list of the chemicals detected at the site, the frequency of detection (i.e., the number of samples in which a chemical was detected compared to the total number of samples analyzed), mean concentration, minimum and maximum detected concentrations, and the 95% upper confidence limit (UCL) of the mean concentration for sample sets containing greater than 10 samples. Background data, if available, will be summarized separately in these tables. The goal of the data summary process is to estimate an exposure point concentration for each chemical at each site that can be appropriately compared with its respective benchmark. The estimation of exposure point concentration has been discussed in Subsection 2.5.

2.4 RECOMMENDED SCREENING BENCHMARKS

Human health and ecological benchmarks will be compiled for comparison with the appropriate chemical concentration (see Subsection 2.4.1). The primary environmental media of concern that will be evaluated are soil, groundwater, surface water, sediment and biota tissue. The human health and ecological benchmarks that are recommended for screening purposes are summarized in the following subsections and in Table 2-1.

**Table 2-1
Recommended Human Health and Ecological Benchmarks**

Media of Concern	Human Health Benchmarks	Ecological Benchmarks
Soil	EPA Soil Screening Levels EPA Region III Risk-Based Concentrations ^a	EPA Region III Ecological Screening Levels Oakridge Screening Benchmarks
Groundwater	EPA Region III Risk-Based Concentrations Virginia Water Quality Standards Federal MCLs Nonzero MCLGs	NA
Surface Water	EPA Region III Risk-Based Concentrations Virginia Water Quality Standards AWQC	AWQC EPA Region III Ecological Screening Levels Virginia Water Quality Standards Oakridge Screening Benchmarks
Sediment	NA	NOAA Sediment Guidelines Ontario Sediment Guidelines EPA Region III Ecological Screening Levels Oakridge Screening Benchmarks
Fish Tissue	EPA Region III Risk-Based Concentrations	NA

^a Risk-Based Concentrations Corresponding to Residential Use Will Be Used

NA = Not Available
MCLs = Maximum Contaminant Levels
MCLGs = Maximum Contaminant Level Goals
AWQC = Ambient Water Quality Criteria
NOAA = National Oceanographic and Atmospheric Administration

2.4.1 Human Health Benchmarks

The human health benchmarks for the chemicals of concern will be compiled from the following sources:

- *EPA Soil Screening Levels* – EPA (1996a) has derived soil screening levels (SSLs) as a tool to facilitate prompt identification of contaminants and exposure areas of concern during remedial actions and some removal actions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). SSLs are risk-based concentrations derived from standardized equations combining conservative (i.e., health protective) default exposure assumptions for residential use with chemical-specific toxicity data obtained from EPA databases (EPA, 1995a, 1997b). Generally, at sites where contaminant concentrations fall below the SSLs, no further action or study is warranted under CERCLA provided that the assumptions used in deriving the SSLs are appropriate for that specific site.
- *EPA Region III Risk-Based Concentrations* - EPA Region III (EPA, 1997c) has developed chemical concentrations corresponding to target levels of risk (i.e., a hazard quotient of one for evaluating noncancer health effects or a lifetime excess cancer risk of 1×10^{-6} whichever occurs at a lower concentration) in tap water, air, fish tissue and soil. As is the case for SSLs, conservative exposure assumptions are based on default values and toxicity data obtained from EPA databases (EPA, 1995a, 1997b). For soil, the risk-based concentrations are derived separately for residential and industrial use scenarios. The risk-based concentrations corresponding to both residential and industrial uses will be used in the site screening process.
- *Virginia Water Quality Standards* - The State of Virginia (VA DEQ, 1992) has developed water quality standards for public water supplies and other surface waters. The standards for the public water supplies have been calculated to protect human health from toxic effects through drinking water and fish consumption. The standards for other surface waters have been calculated to protect human health from toxic effects through fish consumption.
- *Ambient Water Quality Criteria (AWQC)* - U.S. EPA (EPA, 1992b) has developed AWQC for protection of human health from consumption of water and organisms and organisms only. These criteria are used for surface waters where human ingestion of water or fish ingestion is a potential route of exposure.
- *Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs)* – U.S. EPA has developed drinking water standards and health

advisories for a large number of chemicals (EPA, 1996b). MCLs are maximum permissible levels of contaminants in water which is delivered to any user of a public water system. MCLGs are non-enforceable concentrations of drinking water contaminants that are protective of adverse human health effects and allow for an adequate margin of safety.

2.4.2 Ecological Benchmarks

Ecological benchmarks will be compiled from the following sources:

- *EPA Region III Ecological Screening Levels* - EPA Region III has developed ecological benchmarks for soil, sediment, and surface water (EPA, 1995b). The benchmarks have been developed separately for flora and fauna, and are based on the lowest reported values from relevant peer-reviewed sources. The selected benchmarks are considered to be protective of the most sensitive organisms in a given medium.
- *Ambient Water Quality Criteria (AWQC)* - The State of Virginia (VA DEQ, 1992) and the U.S. EPA (EPA, 1992a) have developed AWQC for freshwater aquatic life. AWQC are designed to protect aquatic life from both chronic and acute effects. Chronic AWQC will preferentially be used. If chronic AWQC are not available, then acute AWQC will be used.
- *Oak Ridge National Laboratory Toxicological Benchmarks* - Oak Ridge National Laboratory has developed ecological benchmarks for soil, surface water, and sediment. Soil benchmarks were developed for both earthworms and plants (Will and Suter, 1995a, 1995b). The surface water benchmarks were developed for freshwater aquatic life (Suter and Mabrey, 1994). Sediment benchmarks are based primarily on existing sediment guidelines (Hull and Suter, 1994).
- *Guidelines for the Protection and Management of Aquatic Sediment, Ontario Ministry of the Environment (OMOE, 1993)* - The Ontario Ministry of the Environment has developed low effect levels which can be tolerated by the majority of benthic organisms. The values are derived for freshwater sediments. These guidelines are frequently referred to in Superfund risk assessments, although they are not recommended under current guidelines.
- *National Oceanic and Atmospheric Administration (NOAA) Sediment Guidelines* - NOAA has developed sediment guidelines for biota which represents the lower 10th percentile of the biological effects data (NOAA, 1990). The values are derived from biological effects data for estuarine and marine sediments.

2.5 METHODOLOGY FOR COMPARISON OF BENCHMARKS TO ANALYTICAL DATA

A list of the potential media of concern (i.e., soil, groundwater, surface water, sediment and biota tissue) and the chemicals of concern will be developed for each site as described in Subsection 2.2. Depending on the media, receptors and exposure pathway(s) of concern being evaluated at a site, the appropriate chemical-specific human health and ecological benchmarks for each medium will be obtained from the sources listed in Subsection 2.4. If there is more than one applicable medium-specific human health benchmark for a given chemical, the most conservative (i.e. the lowest) of the appropriate human benchmarks potentially will be selected for comparison with the analytical data, unless there are prevailing factors for selecting another benchmark based on site information, planned land use, or professional judgment. For ecological benchmarks, the most conservative value for a given medium will be used. WESTON will contact the Biological Technical Assistance Group (BTAG) in EPA Region III should any important ecological issues arise.

The comparison process will be conducted separately based on the human health and ecological benchmarks, and will be performed for the media of concern and the corresponding chemicals of concern identified at each site. For the ecological screening analysis, current ecological risk assessment guidance published for Superfund (EPA, 1997d) will be followed where appropriate and in consultation with BTAG.

Available analytical data from all the site samples for each medium of concern will be summarized as described in Subsection 2.3. For human health evaluation, if the number of available site samples is greater than or equal to 10, the 95% upper confidence limit (UCL) of the arithmetic mean concentration will be used for comparison with the selected human health benchmarks provided that the 95% UCL of the mean is below the maximum detected concentration. If the 95% UCL of the mean is greater than the maximum detected concentration, the maximum detected concentration will be used for comparison

with the human health benchmarks. If the number of site samples is less than 10, the maximum detected concentration will be used for comparison with the benchmarks. Where there may be hotspots or other areas of relatively high concentration at a specific site, it may be appropriate to directly compare the concentrations at those individual locations to benchmarks. The exposure concentration calculation procedure will follow guidelines as presented by U.S. EPA (EPA, 1992c). For ecological benchmark comparison, the maximum chemical concentration in each medium will be compared.

2.6 SITE SCREENING DECISION PROCESS

The site screening decisions made by the appropriate decision-managers will be dependent in part on whether the site has been characterized appropriately and if there are adequate analytical data available for comparison with the recommended human health and ecological benchmarks. If the data are inadequate for screening purposes (see Subsection 2.2) or there are potential data gaps, the site will be recommended by WESTON for focused limited sampling to collect additional analytical data that can be used for comparison against the benchmarks at a later date. These recommendations are subject to review by the BCT in making their final decisions. A separate quality assurance plan (QAP) delineating sampling and analytical procedures will be developed and submitted to the BCT for review to implement any potential additional sampling.

Data judged usable and adequate will be screened against the available human health and ecological benchmarks using the methodology described in Subsection 2.5. If the exposure concentration of any chemical in any medium of concern at the site exceeds the designated human health or ecological benchmarks, the site will be recommended for potential further action such as a more focused analysis of the chemicals and the media of concern that exceeded the benchmarks. All exceedances will be thoroughly reviewed to evaluate the assumptions that were used in deriving the benchmarks and the site-related concentration. The nature of the exceedances will also be considered in the decision making process. For example, some exceedances may only be marginal and may be

significantly influenced by a very small area of contamination at the site. In this case, an expedited removal action followed by confirmatory sampling would be appropriate rather than the recommendation of further detailed sampling and evaluation. For other sites with significant exceedances and a relatively large area of contamination, a potential Remedial Investigation and Feasibility Study (RI/FS) may be recommended.

If the concentrations of the chemicals for the media of concern at the site are below the human health and ecological benchmarks, the site will be recommended as NOFA. The potential cumulative effect of chemicals based on a toxicological endpoint will be evaluated for chemicals and sites without exceedances before recommending NOFA. Elements of the Pre-remedial Toxicological Evaluation recommended by EPA Region III will be used as applicable and appropriate during the screening decision process.

SECTION 3

REFERENCES

EPA (U.S. Environmental Protection Agency). 1992a. *Guidance for Data Usability in Risk Assessment (Part A). Final*. Office of Emergency and Remedial Response, Washington, D.C. Publication 9285-7.09A. PB92-963356. April 1992.

EPA (U.S. Environmental Protection Agency). 1992b. *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States' Compliance; Final Rule*. 40 CFR Part 131.

EPA (U.S. Environmental Protection Agency). 1992c. *Supplemental Guidance to RAGS: Calculating the Concentration Term*. OSWER, Washington, D.C., Publication 9285.7-081. May 1992.

EPA (U.S. Environmental Protection Agency). 1995a. *Health Effects Assessment Summary Tables FY-1995 Annual, OSWER*. 9200.6-303 (95-1). EPA/540/R-95/036. May 1995.

EPA (U.S. Environmental Protection Agency). 1995b. *EPA Region III BTAG Screening Levels (Draft)*.

EPA (U.S. Environmental Protection Agency). 1996a. *Soil Screening Guidance: Technical Guidance Background Document*. OSWER, Washington, D.C. 20460. 9355.4-17a. EPA/540/R-95/128. May 1996.

EPA (U.S. Environmental Protection Agency). 1996b. *Drinking Water Regulations and Health Advisories*. Office of Water. EPA 822-B-96-002. October 1996.

EPA (U.S. Environmental Protection Agency). 1997a. *Telephone Conversation Between EPA Region III (Michael Taurino) and Roy F. Weston, Inc. (Robert Warwick)*. 9 September 1997.

EPA (U.S. Environmental Protection Agency). 1997b. *Integrated Risk Information System (IRIS)*. Peer-reviewed toxicity database maintained and updated continuously by the U. S. EPA. Washington, D.C.

EPA (U.S. Environmental Protection Agency). 1997c. *EPA Region III Risk-Based Concentration Table*. 17 March 1997.

EPA (U.S. Environmental Protection Agency). 1997d. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. Interim Final*. Prepared by U.S. EPA, Environmental Response Team, Edison, NJ. 5 June 1997.

- Hull, R.M. and G.W. Suter II. 1994. *Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment-Associated Biota: 1994 Revision*. ES/ER/TM-95/R1. Prepared for the U.S. Dept. of Energy. Prepared by the Environmental Sciences Division, Oak Ridge National Laboratory.
- NOAA (National Oceanographic and Atmospheric Administration). 1990. *Potential for Biological Effects of Sediment-sorbed Contaminants Tested in the National Status and Trends Program*. NOAA Technical Memorandum NOS OMA 52.
- OMOE (Ontario Ministry of the Environment). 1993. *Guidelines for Protection and Management of Aquatic Sediment*. Prepared by D. Prasad, R. Jaagumagi, and A. Hayton. ISBN 0-7778-9248-7. August 1993.
- Suter, G.W. II and J.B. Mabrey. 1994. *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1994 Revision*. ES/ER/TM-96/R1. Prepared for the U.S. Dept. of Energy. Prepared by the Environmental Sciences Division, Oak Ridge National Laboratory.
- USACE (U.S. Army Corps of Engineers). 1997. *Revised Scope of Work, Base Realignment and Closure Program, Preliminary Assessment/Site Inspection (PA/SI) Investigation, Zone 1 – BRAC Areas of Concern, Fort Pickett, Virginia*. Task Order No. 16. 23 May 1997.
- VA DEQ (Commonwealth of Virginia, Department of Environmental Quality). 1992. *Water Quality Standards (VR 680-21-00)*. State Water Control Board Regulations. Effective May 20, 1992.
- WESTON (Roy F. Weston, Inc.). 1997a. *Draft Site Screening Protocol. Fort Pickett, Virginia*. Prepared for USACE, Norfolk District by Roy F. Weston. 2 July 1997.
- WESTON (Roy F. Weston, Inc.). 1997b. *Responses to Comments to Draft site Screening Protocol. Letter from WESTON (R. Warwick) to USACE (D. Kang)*. 12 September 1997.
- WESTON (Roy F. Weston, Inc.). 1997c. *Telephone Conversation Between Virginia Department of Environmental Quality (Durwood Willis) and Roy F. Weston, Inc. (Robert Warwick and Sunil Godbole)*. 4 September 1997.
- Will, M.E. and G.W. Suter II. 1995a. *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Terrestrial Plants: 1995 Revision*. ES/ER/TM-85/R2. Prepared for the U.S. Dept. of Energy. Prepared by the Environmental Restoration Risk Assessment Program, Oak Ridge National Laboratory.
- Will, M.E. and G.W. Suter II. 1995b. *Toxicological Benchmarks for Screening Potential*

Contaminants of Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process. ES/ER/TM-126/R1. Prepared for the U.S. Dept. of Energy. Prepared by the Environmental Restoration Risk Assessment Program, Oak Ridge National Laboratory.

Woodward-Clyde Inc. 1997. *Environmental Baseline Survey Report. Fort Pickett, Virginia.* Prepared for U.S. Corps of Engineers, Norfolk District and Seattle District, 25 February 1997.



Roy F. Weston, Inc.
1 Weston Way
West Chester, Pennsylvania 19380-1499
610-701-3000 • Fax 610-701-3186

ORIGINAL
(Red)

7 October 1997

David Kang
Department of the Army
U.S. Corps of Engineers, Norfolk District
803 Front Street
Norfolk, VA 23510-1096

**Subject: Data Catalog, Seven Parcels in Zone 1, Fort Pickett, Virginia
Contract No. DAC A65-95-D-0051; Delivery Order No. 0016**

Dear Mr. Kang:

Please find enclosed three (3) copies of the "Data Catalog" of the site data for seven parcels in Zone 1 at Fort Pickett. This information was gathered from our site reconnaissance, records review and interview tasks, and represents the available information that will be used in the site screening procedure as described in Task 6 of the current delivery order. One copy each should be forwarded to Mr. Graham Ellixson and Mr. Francis Gilmore. If you have any questions, please do not hesitate to call me at (610) 701-7276.

Sincerely,

ROY F. WESTON, INC.

Robert O. Warwick, Jr.
Robert O. Warwick, Jr., Ph.D.
Technical Manager

Enclosure

cc: David Foley, U.S. Army Garrison, Fort Pickett (2 copies)
Durwood Willis, VA DEQ (2 copies)
Michael Taurino, U.S. EPA Region III (5 copies)
Francis Gilmore, Norfolk District (1 copy)
Graham Ellixson, Norfolk District (1 copy)
Mark Cramer, WESTON (1 copy)
David Elam, WESTON (1 copy)
Ed Mackey, WESTON (1 copy)
Michael Werner, WESTON (1 copy)
Sunil Godbole, WESTON (1 copy)
Eva Timmer, WESTON (1 copy)



ORIGINAL
(Red)

DATA CATALOG

Seven Parcels in Zone 1 Fort Pickett, Virginia

Prepared for:

**U.S. Army Corps of Engineers
Norfolk District**

7 October 1997

Prepared by:

**ROY F. WESTON, INC.
Morrisville, North Carolina 27560-9658**

W.O. # 03886-181-002-0006-00

- Soil gas samples from 21 locations. A soil gas survey was conducted to detect volatile organic hydrocarbons in soil and groundwater. Total organic vapors were detected at 5 locations.
- Soil samples from 5 borings (various depths up to 5 feet). Soil samples were analyzed for total metals, volatile organic compounds (VOCs), and polycyclic aromatic hydrocarbons (PAHs). Arsenic, barium, cadmium, chromium and lead were detected at various locations. Other analytes were not detected.
- Groundwater samples from 3 monitoring wells. The groundwater samples were analyzed for total metals, VOCs, and PAHs. Only 3 metals were detected (barium, chromium, and lead).

2. *Groundwater Monitoring Results from October 1990.*

These results were listed as Reference 12 in the *Preliminary Assessment Report Addendum* (WESTON, 1992) and are presented in this catalog as Appendix C. Groundwater samples were obtained from 3 wells and were analyzed for arsenic, barium, cadmium, chromium, and lead. Detection limits and measured data are presented. Barium, chromium, cadmium, and lead were detected.

3. *Analytical results from a groundwater sampling report prepared by ETS Analytical Services, Inc. Fire Training Pit Project. (ETSI, 1997).*

Nine (9) groundwater samples were obtained in February 1997 from 3 wells (3 samples from each individual well). The sampling results are presented in Appendix D of this catalog. These samples were analyzed for arsenic (Method 7060), barium (Method 6010A), cadmium (Method 7131), chromium (Method 6010A), and lead (Method 7421). Barium was detected in all samples and lead was detected in 1 sample. Other metals were below the detection limits.

Training and Range Area (Parcel No. 11[4] PR) – 850 Gallons of JP-4 Spill from Tanker Truck

1. *Spill/Accident Report.* 10 June 1992. Prepared by Mr. David Foley (Fort Pickett Army Garrison, Directorate of Public Works Environmental Office).

Analytical data have not been collected at this site.

Operations Area (Parcel No. 12 [7]) – Metallic Debris Disposal Area

Specific documents and analytical data do not currently exist for this site.

Southeast Cantonment Area (Parcel No. 105[3] PS/PR) – Underground Storage Tank at Building 614 (Removed in August 1995)

1. *Underground Storage Tank Closure Report, Building 614, U.S Army Garrison, Fort Pickett, Blackstone, Virginia.* Submitted to Virginia Department of Environmental Quality, Glen Allen, VA. Prepared by Omega Environmental Services, Inc. Richmond, VA. Omega Project No. 95-025nm. 15 September 1995 (Omega, 1997).

This report includes analytical results for 1 composite soil sample. The soil sample was analyzed for total petroleum hydrocarbons (TPH Method 8015) and benzene, toluene, ethyl benzene, and xylene (BTEX Method 8020). TPH was detected at 12.2 ppm. BTEX results were below detection limits. The results are shown in Appendix E of this catalog.

Agricultural Research Area (Former Prison Area) (Parcel No. 308[7])

Specific documents and analytical data do not currently exist for this site with the exception of historical drawings and a site layout map.

Borrow Pit (Parcel No. 309[7]) – Possible Former Flame Thrower Training Area

Specific documents or analytical data do not currently exist for this site.

CONCLUSIONS AND RECOMMENDATIONS

Data are available for 3 of the 7 sites based on records review. These sites include the Agricultural Research Area (Parcel No. 10[7] PR/HR), Agricultural Research Area (Parcel No. 103[3] HR), and the Southeast Cantonment Area (Parcel No. 105[3] PS/PR). However, the adequacy and usability of the available data for these sites require evaluation as part of the risk-based site screening process. This task will be undertaken at the same time as the evaluation of data usability and adequacy for the additional 18 areas of concern in Zone 1 to be conducted later this year.

WESTON will conduct a site reconnaissance and records review to gather data on the remaining 18 sites in Zone 1. Once all of these data have been collated, a detailed evaluation of data adequacy and usability on all available data for all sites in Zone 1 will be performed as part of the site screening process described in the final site screening protocol (WESTON, 1997). As discussed in the final site screening protocol (WESTON, 1997), recommendations will be made at that time concerning the specific nature of additional sampling (i.e., number and location of samples, types of analyses, detection limits required, etc.).

A closure report for the underground storage tank at the Southeast Cantonment Area (Parcel No. 105[3] PS/PR) has been submitted to Virginia Department of Environmental Quality (DEQ) for approval. Current soil data indicate TPH levels are well below Virginia's typical action level (100 mg/kg) requiring further action or risk-based evaluation, and the DEQ solid waste soil standard (50 mg/kg) for re-use of soil as clean fill. If DEQ accepts the closure report, this site may not require further sampling and will be recommended for No Further Action (NOFA).

The 4 sites without available analytical data would most likely be recommended for focused limited sampling. These include the Training and Range Area (Parcel No. 11[4] PR), the Operations Area (Parcel No. 12[7]), the Agricultural Research Area (Parcel No. 308[7]), and the Borrow Pit (Parcel No. 309[7]).

REFERENCES

- ERI (Environmental Research Inc.). 1997. *Aerial Photographic Analysis, Fort Pickett BRAC Parcel, Blackstone, Virginia*. September 1997.
- ESE (Environmental Science and Engineering, Inc.). 1982. *Installation Assessment of the U.S. Army Garrison, Fort Pickett, Blackstone, Virginia*. Report No. 316B. April 1982.
- ETSI (ETS Environmental, Inc.). 1997. *Analytical results from a groundwater sampling report prepared by ETS Analytical Services, Inc. Fire Training Pit Project*. February 1997.
- Hunter/ESE (Hunter/Environmental Science and Engineering, Inc.). 1990. *Preliminary Assessment/Site Investigation, Fire Training Area, Fort Pickett, Virginia*. Prepared for U.S. Army Corps of Engineers (USACE), Kansas City, MO. No. 3-90-2012-0200. May 1990.
- Omega (Omega Environmental Services, Inc.). 1995. *Underground Storage Tank Closure Report, Building 614, U.S. Army Garrison, Fort Pickett, Blackstone, Virginia*. Submitted to Virginia Department of Environmental Quality, Glen Allen, VA. Omega Project No. 95-025nm. 15 September 1995.
- Spill/Accident Report*. 10 June 1992. Prepared by Mr. David Foley (Fort Pickett Army Garrison, Directorate of Public Works Environmental Office).
- USACE (U.S. Army Corps of Engineers). 1997. *Revised Scope of Work, Base Realignment and Closure Program, Preliminary Assessment/Site Inspection (PA/SI) Investigation, Zone 1 – BRAC Areas of Concern, Fort Pickett, Virginia*. Task Order No. 16. 23 May 1997.
- USAEHA (U.S. Army Environmental Hygiene Agency). 1982. *Pesticide Special Investigation No. 20-44-0956-82, Analysis of Soil Samples for Polychlorinated Biphenyls (PCBs), Fort Pickett, Virginia*. Aberdeen Proving Ground, Maryland. 16 June 1982.
- WESTON (Roy F. Weston, Inc.). 1992. *Preliminary Assessment Report Addendum for Fort Pickett, Virginia*. Prepared for the U.S. Army Corps of Engineers, Toxic and Hazardous Materials Agency. Aberdeen Proving Ground, Maryland 21010-5401. Contract No. DAAA 15-90-D-0009. Delivery Order 10. March 1992.
- WESTON (Roy F. Weston, Inc.). 1997. *Final Site Screening Protocol, Fort Pickett, Virginia*. Prepared for the U.S. Army Corps of Engineers, Norfolk District. Contract No. DAC A65-95-D-0051, Delivery Order No. 0016. 17 September 1997.
- Woodward-Clyde Inc. 1997. *Environmental Baseline Survey Report, Fort Pickett, Virginia*. Prepared for U.S. Corps of Engineers, Norfolk District and Seattle District. 25 February 1997.

APPENDIX A

**Analysis of Soil Samples for PCBs near Building 4072
Agricultural Research Area (Parcel No. 10[7] PR/HR)**

*Results of PCB Analyses
of Soil Samples at
Quarters 4072 (Transformer
pole)*

ATEN-FN (24 Jun 82) 1st Ind
SUBJECT: Pesticide Special Investigation No. 20-44-0956-82, Analysis of Soil
Samples for Polychlorinated Biphenyls (PCBs), Fort Pickett, Virginia
16 June 1982

HQ TRADOC, Fort Monroe, VA 23651 30 JUL 1982

TO: Commander, Fort Pickett, Blackstone, VA 23624

1. Subject report forwarded for information and action.
2. HQ TRADOC guidance for turn-in of PCB items to DPDO is provided at inclosure 2.
3. HQ TRADOC POC is 1LT Waligora, AUTOVON 680-2362.

FOR THE COMMANDER:

2 Incl
Added 1 Incl
2. as


DOREATHA MANGRUM
ASSISTANT ADJUTANT GENERAL



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY MS EHRHARDT/eoh/AUTOVON
U.S. ARMY ENVIRONMENTAL HYGIENE AGENCY 584-3613
ABERDEEN PROVING GROUND, MARYLAND 21010

HSHB-RP-MO

24 JUN 1982

SUBJECT: Pesticide Special Investigation No. 20-44-0956-82, Analysis of Soil Samples for Polychlorinated Biphenyls (PCBs), Fort Pickett, Virginia
16 June 1982

Commander
US Army Training and Doctrine Command
ATTN: ATMD
Fort Monroe, VA 23651

1. AUTHORITY. Letter, ATZM-FPE, Fort Pickett, Blackstone, Virginia, 28 May 1982, subject: Analysis of Soil Samples from Fort Pickett.
2. REFERENCE. Title 40, Code of Federal Regulations (CFR), 1981 rev., Part 761, Polychlorinated Biphenyls (PCBs), Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions.
3. PURPOSE. To determine the presence and extent of PCBs and to provide assistance as requested in the solution of any related technical or administrative problems.
4. FINDINGS. As requested in paragraph 1, results of electron-capture, gas-liquid chromatographic and/or density analyses are inclosed. The PCBs analyzed for included Aroclor® 1016, 1221, 1232, 1242, 1248, 1254, 1260, and 1262. Per 40 CFR 761, subject fluid samples may be categorized as "non-PCB" (less than 50 ppm PCBs), "PCB-contaminated" (greater than or equal to 50 ppm but less than 500 ppm PCBs) or "PCB" (500 ppm PCBs or greater).

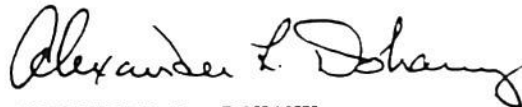
®Aroclor is a registered trademark of Monsanto Company, 800 N. Lindbergh Blvc, St. Louis, MO 63166. Use of trademarked names does not imply endorsement by the US Army, but is intended only to assist in identification of a specific product.

HSHB-RP-MO

SUBJECT: Pesticide Special Investigation No. 20-44-0956-82, Analysis of Soil
Samples for Polychlorinated Biphenyls (PCBs), Fort Pickett, Virginia,
16 June 1982

5. TECHNICAL ASSISTANCE. Further information relative to the PCB analysis may
be obtained by calling the Project Officer, Ms. Sandra Ehrhardt, AUTOVON 584-
3613/4131.

FOR THE COMMANDER:



ALEXANDER L. DOHANY
LTC, MSC
Acting Director, Radiation and
Environmental Sciences

1 Incl
as

CF:
HQDA (DASG-PSP)
Cdr, HSC (HSPA-P)
Cdr, TRADOC (ATEN)
Cdr, MEDDAC, Fort Lee (PVNTMED Actv)(2 cy)
C, USAEHA Rgn Div - North

HSHB-RP-MO

SUBJECT: Pesticide Special Investigation No. 20-44-0956-82, Analysis of Soil
Samples for Polychlorinated Biphenyls (PCBs), Fort Pickett, Virginia,
16 June 1982

TABLE. Results of Analysis.

<u>SAMPLE NO.</u>	<u>USAEHA NO.</u>	<u>PCB RESIDUE (ppm)</u>
PCB-10	Sp 5532	ND*
PCB-20	Sp 5533	ND.
PCB-30	Sp 5534	ND
PCB-40	Sp 5535	ND



CHARLES A. MOORE
CPT, MSC
Chief, Pesticide Analysis Branch
Organic Environmental
Chemistry Division

* No PCBs detected at a lower limit of detectability of 1 ppm.

APPENDIX B

Soil Gas, Soil, and Groundwater Data (November 1989)
Former Fire Training Area
Agricultural Research Area (Parcel No. 103[3] HR)

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3.0 SAMPLING RESULTS

3.1 SOIL GAS

The measured FID concentrations of total organic vapors for each station are presented in Table 3-1. The only detectable measurements were obtained at the probes adjacent to the four corners of the pit, SG-4, SG-6, SG-13, SG-15, and the probe midway along the northern edge of the pit, SG-14. The highest readings obtained were 100 and 68 ppm at the northwest, SG-13, and southeast, SG-6, corners, respectively. The remaining readings ranged from 5 to 26 ppm. The contaminant plume is likely to extend no farther than 25 ft from the pit boundaries, since no contaminants were detected in the outermost grid locations.

3.2 SOILS

Soil samples were analyzed for total metals, VOCs, and PAHs as listed in Table 2-1. The only analytes observed above detection limits were the following five metals [with concentration ranges, milligrams per kilogram (mg/kg)]:

1. Arsenic (below detection limit to 3.87),
2. Barium (10.5 to 22.9),
3. Cadmium (0.610 to 2.07),
4. Chromium (2.74 to 31.5), and
5. Lead (below detection limit to 8.58).

Table 3-2 presents the results of the chemical analyses of soil samples found to contain the above-listed contaminants. Appendix B contains the complete set of laboratory results for soil sample analyses.

Table 3-1. Soil Gas Results

Station ID	Date Installed	Depth (ft)	Date Sampled	FID Reading (ppm)
SG-1	06-Nov-89	3.0	08-Nov-89	0
SG-2	06-Nov-89	4.0	08-Nov-89	0
SG-3	06-Nov-89	3.5	08-Nov-89	0
SG-4	06-Nov-89	3.5	08-Nov-89	26
SG-5	06-Nov-89	3.0	08-Nov-89	0
SG-6	06-Nov-89	3.2	08-Nov-89	68
SG-7	06-Nov-89	3.5	08-Nov-89	0
SG-8	06-Nov-89	3.5	08-Nov-89	0
SG-9	06-Nov-89	4.0	08-Nov-89	1
SG-10	06-Nov-89	4.0	08-Nov-89	0
SG-11	06-Nov-89	3.5	08-Nov-89	0
SG-12	06-Nov-89	3.5	08-Nov-89	0
SG-13	06-Nov-89	3.0	08-Nov-89	100
SG-14	06-Nov-89	3.0	08-Nov-89	15
SG-15	06-Nov-89	3.5	08-Nov-89	5
SG-16	06-Nov-89	3.5	08-Nov-89	0
SG-17	06-Nov-89	3.5	08-Nov-89	0
SG-18	06-Nov-89	3.5	08-Nov-89	0
SG-19	06-Nov-89	3.5	08-Nov-89	0
SG-20	06-Nov-89	3.5	08-Nov-89	0
SG-21	06-Nov-89	3.0	08-Nov-89	0

Source: Hunter/ESE, 1990.

Table 3-2. Analyte Concentrations in Soil Samples

Boring	Sample	Depth (inches)	Analyte Concentration (mg/kg)				
			Arsenic	Barium	Cadmium	Chromium	Lead
SB-1	PICKS*1	56-60	BDL	14.6	0.759	3.28	8.01
SB-1	PICKS*11 (duplicate)	56-60	BDL	14.0	0.610	2.74	6.35
SB-2	PICKS1*5	12-24	2.10	14.7	2.07	12.6	6.81
SB-3	PICKS1*7	48-60	1.38	10.5	0.645	5.87	BDL
SB-4	PICKS1*9	32-40	1.99	14.1	1.79	10.0	5.01
SB-5	PICKS1*3	12-24	3.87	22.9	2.34	31.5	8.58

Note: BDL = below detection limits.

Source: Hunter/ESE, 1990.

For a given metal, contaminant concentrations in the four samples from the pit corners were approximately of the same order of magnitude, but lower than the background levels observed in SB-5. This suggests that contaminants may have been successfully contained by the pit berms in the past.

Based on the results of the monitor well borings, the subsurface geology is relatively consistent across the site. The surficial stratum encountered during drilling consists of a weathered saprolitic formation with loose to dense silty sand ranging in color from pink to orange. Gradation to less weathered zones is gradual, generally occurring within the first 10 to 15 ft as evidenced by occurrence of larger rock fragments.

3.3 GROUNDWATER

Water samples were analyzed for total metals, VOCs, and PHCs as listed in Table 2-1. The only analytes observed above detection limits were the following three metals [with concentration ranges, milligrams per liter (mg/L)]:

1. Barium (0.0811 to 0.152),
2. Chromium (0.0088 to 0.0126), and
3. Lead (0.0503 to 0.119).

Table 3-3 presents the results of the chemical analyses of groundwater samples found to contain the above-listed contaminants. Arsenic and cadmium found in the soil samples were not detected in the groundwater. Appendix B contains the complete set of laboratory results for groundwater sample analyses.

Concentrations of barium and chromium were approximately of the same order of magnitude in each well. Levels of lead in MW-2 and MW-3 were

Table 3-3. Analyte Concentrations in Groundwater Samples

Monitor Well	Sample	Analyte Concentration (mg/L)				
		Arsenic	Barium	Cadmium	Chromium	Lead
MW-1	PICKW1*1	BDL	0.145	BDL	0.0088	0.0503
MW-2	PICKW1*2	BDL	0.143	BDL	0.0098	0.0993
MW-2	PICKW1*4 (duplicate)	BDL	0.152	BDL	0.0126	0.0940
MW-3	PICKW1*3	BDL	0.0811	BDL	0.0105	0.119

Note: BDL = below detection limits.

Groundwater samples not field filtered.

Source: Hunter/ESE, 1990.

Concentrations of barium and chromium were approximately of the same order of magnitude in each well. Levels of lead in MW-2 and MW-3 were approximately twice as high as the concentration from the background well, MW-1.

APPENDIX C

Groundwater Monitoring Results (October 1990)
Former Fire Training Area
Agricultural Research Area (Parcel No. 103[3] HR)

92. Burge Avenue, Richmond, VA 23.
(804) 271-3440

On 1 Dec 90 send copy
of these results to Ed Brinkman,
Kansas City District, COE and
Kim Watters, Advanced Sciences, Inc.
Date Received: 10/25/90 (Consulted to
Date Reported: 11/28/90 USATHA#1A)
Work Order: 90-10-305
Category: WIRICK

USG - Fort Pickett
DEH, Bldg. T-234
Blackstone, VA 23824-5000

Attn:

Work ID: GROUNDWATER MONITORING
P O # :

Test	Units	MW - 2 DUP			MW - 3
		10/25/90 11:30	10/25/90 11:42	10/25/90 11:45	
Arsenic	mg/L	<0.004	<0.004	<0.004	<0.004
Barium	mg/L	3.21	0.273	0.083	0.099
Cadmium	mg/L	0.0029	0.0021	0.0037	0.0009
Chromium	mg/L	<0.0005	0.0026	<0.0005	<0.0005
Lead	mg/L	0.002	<0.001	<0.001	<0.001

Samples collected by ELI personnel

Certified By:

Audrey A. Burbeck
ELI

Five Training Pit
at Blackstone Airfield
MW-1 is up gradient, MW-2 and MW-3 are down gradient

APPENDIX D

Groundwater Results for Metals (February 1997)
Former Fire Training Area
Agricultural Research Area (Parcel No. 103[3] HR)

Environmental Laboratories



A Division of ETS Analytical Services, Inc.

A subsidiary of ETS International, Inc.

USG - Fort Pickett
DEH, Bldg. T-234
Blackstone, VA 23824-5000

Attn: David Foley

Work Order No. 9702126

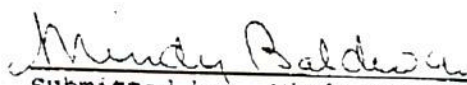
Received Date: 02/19/97

Report Date: 03/19/97

Report Time: 11:00:29

Regulatory Type RCRA
Project Fire Training Pit
P. O. Number VISA-
Sampled by: J. Wasseen

Sample No	Client Id and Description	Sample Date/Time
9702126-01A	MW-1 GRAB	02/19/97 11:35
9702126-01B	MW-1 GRAB	02/19/97 11:35
9702126-01C	MW-1 GRAB	02/19/97 11:35
9702126-02A	MW-2 GRAB	02/19/97 11:45
9702126-02B	MW-2 GRAB	02/19/97 11:45
9702126-02C	MW-2 GRAB	02/19/97 11:45
9702126-03A	MW-3 GRAB	02/19/97 11:55
9702126-03B	MW-3 GRAB	02/19/97 11:55
9702126-03C	MW-3 GRAB	02/19/97 11:55


Submitted by: Mindy Baldwin,
Laboratory Manager





Work Order: 9702126

Page 1

USG - Fort Pickett

Receive Date: 02/19/97

DEH, Bldg. T-234

Report Date: 03/19/97

Blackstone, VA 23824-5000

Report Time: 11:00:29

FINAL REPORT

Attn: David Foley

Sample No. 9702126-01A MW-1 GRAB

Analysis	Result Units	Detection Limit	Analysis		
			Date	Time	Analyst
Arsenic	BDL mg/L	0.005	02/26/97	11:55	MLM
Barium	0.064 mg/L	0.005	03/03/97	17:46	MLM
Cadmium	BDL mg/L	0.0005	02/27/97	15:24	MLM
Chromium	BDL mg/L	0.015	03/03/97	17:46	MLM
Lead	0.026 mg/L	0.005	02/27/97	17:09	MLM

Sample No. 9702126-01B MW-1 GRAB

Analysis	Result Units	Detection Limit	Analysis		
			Date	Time	Analyst
Turbidity	16.20 NTU	0.12	02/19/97	17:30	TR

Sample No. 9702126-01C MW-1 GRAB

Analysis	Result Units	Detection Limit	Analysis		
			Date	Time	Analyst
pH (analyzed on site)	4.63 pH units	NA	/	/	

Sample No. 9702126-02A MW-2 GRAB

Analysis	Result Units	Detection Limit	Analysis		
			Date	Time	Analyst
Arsenic	BDL mg/L	0.005	02/26/97	12:01	MLM
Barium	0.041 mg/L	0.005	03/03/97	17:53	MLM
Cadmium	BDL mg/L	0.0005	02/27/97	15:49	MLM
Chromium	BDL mg/L	0.015	03/03/97	17:54	MLM



Work Order: 9702126
 USG - Fort Pickett
 DEH, Bldg. T-234
 Blackstone, VA 23824-5000

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 Receive Date: 02/19/97
 Report Date: 03/19/97
 Report Time: 11:00:29
FINAL REPORT

Attn: David Foley

Sample No. 9702126-02A MW-2 GRAB

Analysis	Result Units	Detection Limit	Analysis		Analyst
			Date	Time	
Lead	0.007 mg/L	0.005	02/27/97	17:31	MLM

Sample No. 9702126-02B MW-2 GRAB

Analysis	Result Units	Detection Limit	Analysis		Analyst
			Date	Time	
Turbidity	15.10 NTU	0.12	02/19/97	17:30	TR

Sample No. 9702126-02C MW-2 GRAB

Analysis	Result Units	Detection Limit	Analysis		Analyst
			Date	Time	
pH (analyzed on site)	4.67 pH units	NA	/	/	

Sample No. 9702126-03A MW-3 GRAB

Analysis	Result Units	Detection Limit	Analysis		Analyst
			Date	Time	
Arsenic	BDL mg/L	0.005	02/26/97	12:41	MLM
Barium	0.041 mg/L	0.005	03/03/97	18:01	MLM
Cadmium	BDL mg/L	0.0005	02/27/97	15:55	MLM
Chromium	BDL mg/L	0.015	03/03/97	18:01	MLM
Lead	0.006 mg/L	0.005	02/27/97	17:47	MLM



Work Order: 9702126
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Blackstone, VA 23824-5000

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Receive Date: 02/19/97
Report Date: 03/19/97
Report Time: 11:00:29
FINAL REPORT

Attn: David Foley

Sample No. 9702126-03B MW-3 GRAB

<u>Analysis</u>	<u>Result Units</u>	<u>Detection Limit</u>	<u>Analysis</u>		
			<u>Date</u>	<u>Time</u>	<u>Analyst</u>
Turbidity	16.40 NTU	0.12	02/19/97	17:30	TR

Sample No. 9702126-03C MW-3 GRAB

<u>Analysis</u>	<u>Result Units</u>	<u>Detection Limit</u>	<u>Analysis</u>		
			<u>Date</u>	<u>Time</u>	<u>Analyst</u>
pH (analyzed on site)	4.78 pH units	NA	/	/	



REPORTING ABBREVIATIONS AND DEFINITIONS

BDL = Below Detection Limit. The analyte was not detected or was below a quantifiable level. Types of detection limits are defined below.

NA = Not Available. Refers to an analytical result, a detection limit, or a control limit which is not yet available for reporting.

Summary of Analytical Methods

Workorder: 9702126

Date Reported: 03/19/97 11:00:30

<u>Test Name</u>	<u>Analytical Methods</u>
Arsenic	SW-846, 7060
Barium	SW-846, 6010A
Cadmium	SW-846, 7131
Chromium	SW-846, 6010A
Digest for As & Se by GFAA	SW-846, 7060 & 7740
Lead	SW-846, 7421
Sampling Charges	Not Applicable,
Total Digest -ICP/FLAA	SW-846, 3010
Total Digest for GFAA	SW-846, 3020
Turbidity	180.1
pH (analyzed on site)	150.1

APPENDIX E

**TPH Composite Soil Sample Results
UST at Building 614
Southeast Cantonment Area (Parcel No. 105[3] PS/PR)**

2.0 SITE CHECK

2.1 SOIL SAMPLING AND CHEMICAL ANALYSES

One composite soil sample was collected from the UST basin at a depth of approximately 7 feet and was submitted for TPH, BTEX, and EOX analysis (Figure 1). Soil samples were not collected beneath the product lines as the lines did not extend far from the USTs. The soil sample was screened for organic vapors using an organic vapor analyzer (OVA), and submitted to Environmental Testing and Consulting, Inc., and was tested for TPH, BTEX, and EOX using methods 8015, 8020, and 9020A, respectively. Detectable vapors were not observed with the OVA. Analytical results indicated that the soil collected from the UST basin contained only minor TPH and EOX concentrations. Analytical results are shown in Table 2. Certificates of Analyses and Chains of Custody are included in Appendix B.

TABLE 2. ANALYTICAL RESULTS					
Location	Sample I.D.	Sample Depth (feet)	TPH (mg/kg)	BTEX (mg/kg)	Extractable Organic Halides (mg/kg)
TP-1	OE-2232-TP460	7	12.2	BDL	0.28
mg/kg = milligram per kilogram BDL = Below Detection Limit					

2.2 OTHER OBSERVATIONS

During excavation the UST system, ground water and bedrock were not encountered in the UST basins. Holes were not observed on the UST. Petroleum odors were not encountered during excavation activities.